INCH-POUND

MIL-R-6106/50B
8 June 1993
SUPERSEDING
MIL-R-6106/50A
21 Jul 1992

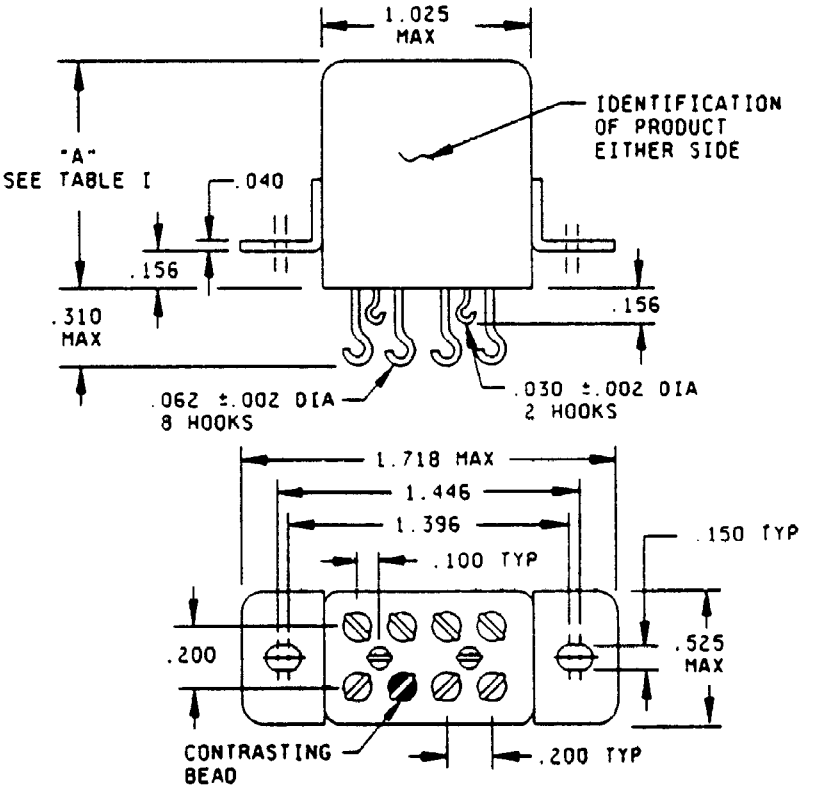
MILITARY SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, TYPE I, MAGNETIC LATCH, LOW LEVEL TO 10 AMPERES, 2 PDT, HERMETICALLY SEALED

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-R-6106.

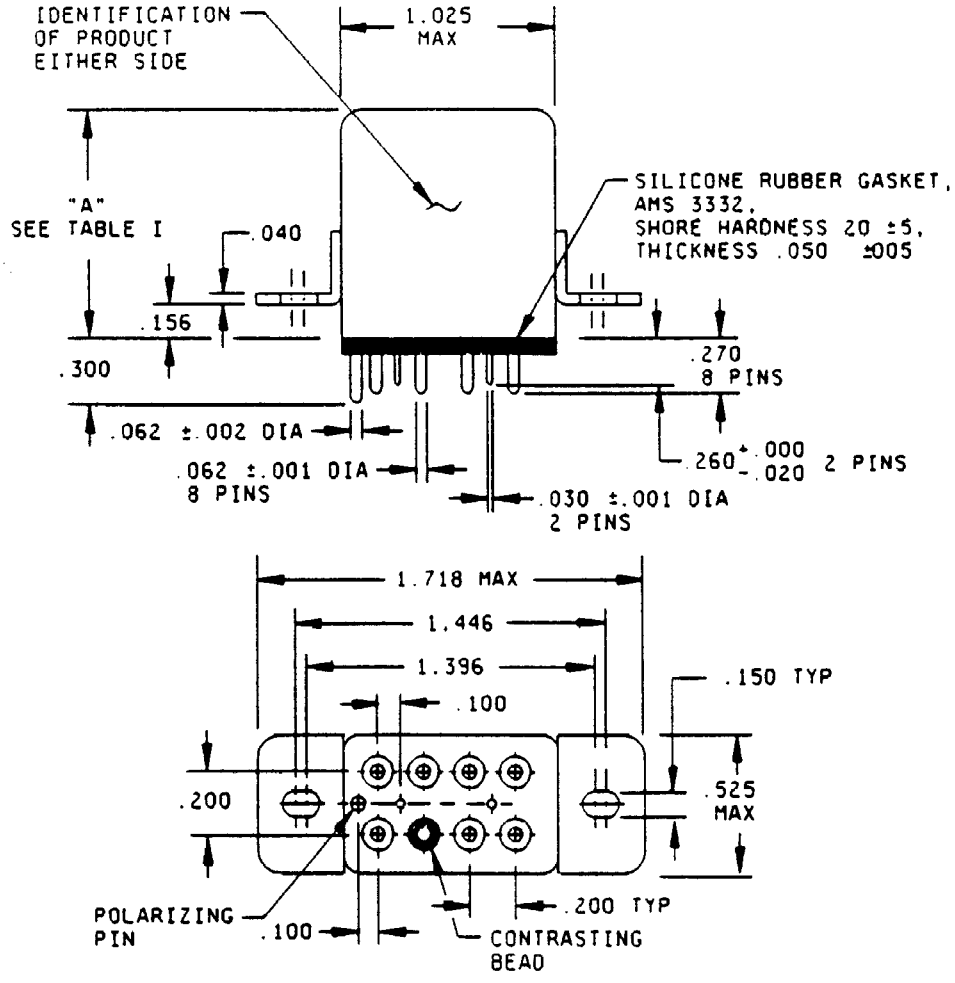
Inches	mm
.002	0.05
.030	0.76
.040	1.02
.062	1.58
.100	2.54
.150	3.81
.156	3.96
.200	5.08
.310	7.87
.525	13.34
1.025	26.04
1.396	35.46
1.446	36.73
1.718	43.64



NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. All hooks shall be tin finished.

FIGURE 1. Raised vertical flange with solder hooks.

Inches	mm
.000	0.00
.001	0.03
.005	0.13
.020	0.51
.030	0.76
.040	1.02
.050	1.27
.060	1.52
.062	1.58
.100	2.54
.150	3.81
.156	3.96
.200	5.08
.260	6.60
.270	6.86
.300	7.62
.525	13.34
1.025	26.04
1.393	35.46
1.446	36.73
1.178	43.64

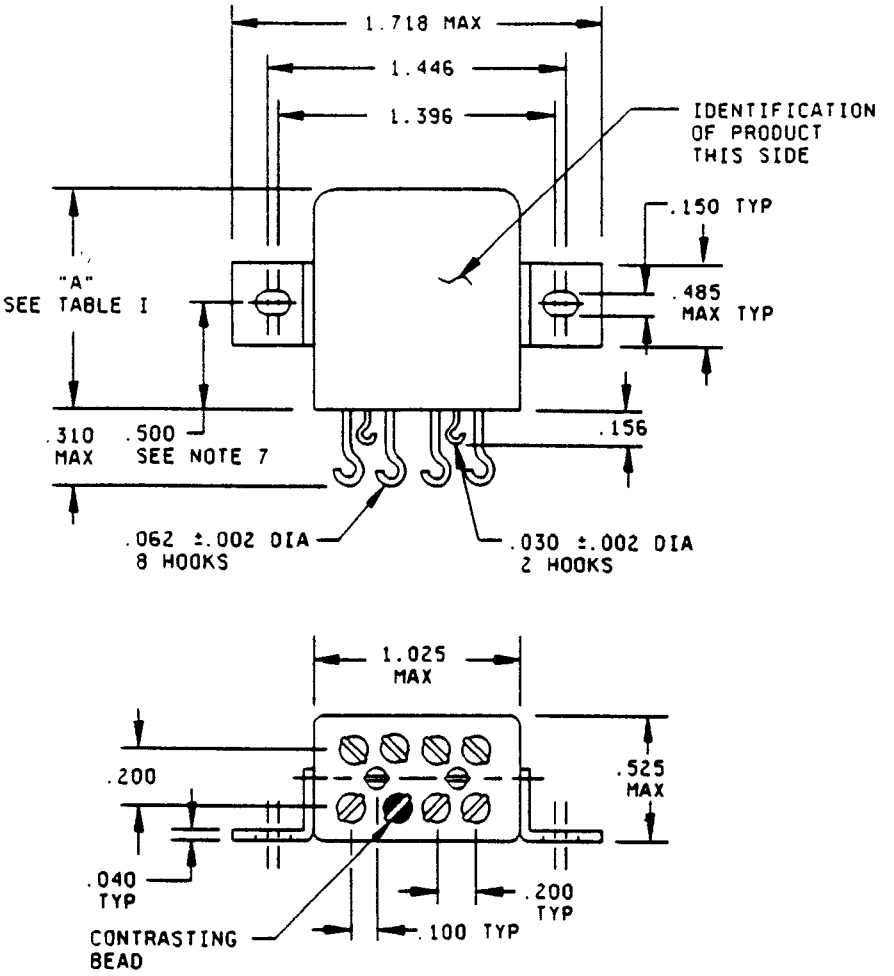


NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. Pins shall be gold plated in accordance with MIL-G-45204, type II, class I. Underplating shall be nickel, 50 to 150 microinches thick (gold plating of polarizing pin optional).

FIGURE 2. Raised vertical flange mount with socket pins.

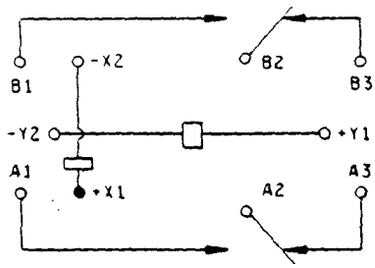
Inches	mm
.002	0.05
.030	0.76
.040	1.02
.062	1.58
.100	2.54
.150	3.81
.156	3.96
.200	5.08
.310	7.87
.500	12.70
.525	13.34
1.025	26.04
1.396	35.46
1.446	36.73
1.718	43.64



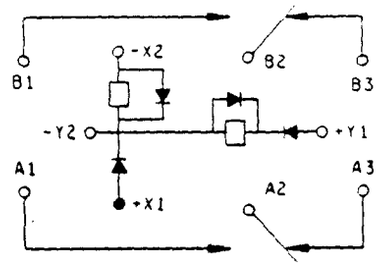
NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. All hooks shall be tin finished.
7. This dimension is .550 for suppressed coil relays.

FIGURE 3. Horizontal flange mount with solder hooks.

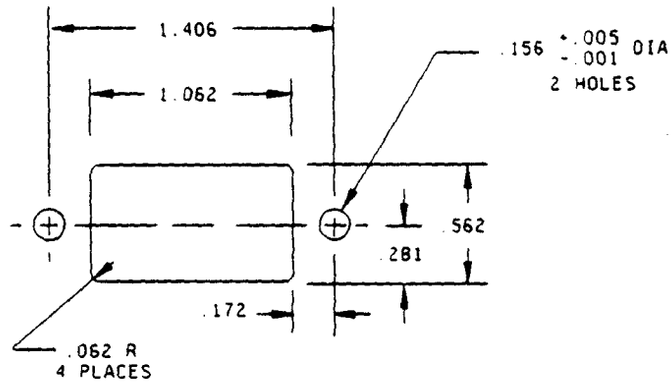


CIRCUIT DIAGRAM A
TERMINAL VIEW, AC COILS
AND DC UNSUPPRESSED COILS



CIRCUIT DIAGRAM B
TERMINAL VIEW,
DC SUPPRESSED COIL
SEE NOTE 8

Inches	mm
.001	0.03
.005	0.13
.062	1.58
.156	3.96
.172	4.37
.312	7.93
.562	14.27
1.062	26.98
1.406	35.71



MOUNTING HOLE LAYOUT
APPLICABLE TO FIGURES 1 AND 3

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Relays shall have a (+) sign placed on the circuit diagram as shown.
4. Coil symbol is optional in accordance with MIL-STD-1285. Polarity does not apply to ac coils.
5. Circuit diagram shown on relay is the terminal view.
6. To close A1 and B1 contacts (operate), energize X1 and X2.
7. To close A3 and B3 contacts (reset), energize Y1 and Y2.
8. Transient voltage (emf) is 5 V dc maximum. Diodes shall have a peak inverse voltage rating of 600 V dc.

FIGURE 4. Circuit diagrams and mounting hole layout.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded).

Resistive: 10 A at 28 V dc, 115 V ac, 400 Hz, 1 phase and 3 phase.

Inductive: 8 A at 28 V dc, 115 V ac, 400 Hz, 1 phase and 3 phase (Life: 20,000 cycles).

Motor: 4 A at 28 V dc, 115 V ac, 400 Hz, 1 phase and 3 phase.

Lamp: 2 A at 28 V dc, 115 V ac, 400 Hz, 1 phase.

Low level: 10-50 μA at 10-50 mV dc or peak ac.

Mechanical life (reduced current): 2.5 A at 28 V dc, 115 V ac, 400 Hz, 1 phase and 3 phase.

Intermediate current: Applicable.

Load transfer: Not applicable.

Overload current: 40 A dc, 60 A ac.

Rupture current: 50 A dc, 80 A ac.

Contact voltage drop or resistance: 1/ 2/.

High level:

Initial: 0.150 volt.

After life: 0.175 volt.

Low level: 3/.

Initial: 0.050 Ω maximum.

After life: 0.150 Ω maximum.

Contact bounce: 1.0 ms maximum.

1/ The alternate low level test of operational reliability shall be used for group A inspection.
2/ For group A contact voltage drop test, high level testing shall be performed first, followed by low level testing. The contact shall not make or break the high level load.
3/ For low level, the following shall apply:
a. During endurance, contact load shall be 10 μA to 50 μA; 10 mV to 50 mV open circuit voltage, 100 ohms maximum contact resistance.
b. Static contact resistance shall be performed at 50 mA maximum, 50 mV maximum.

COIL DATA: See table I.

Operate time: 10 ms maximum for dc coils with rated coil voltage.
20 ms maximum for ac coils with rated coil voltage.

ELECTRICAL DATA:

Insulation resistance, initial: 100 mΩ.

After life or environmental tests: 50 mΩ.

Dielectric withstanding voltage (sea level):	Initial V rms (60 Hz)	After life tests V rms (60 Hz)
Coil to coil	1,000	1,000
Coil to case	1,000	1,000
All other points	1,250	1,000

Dielectric withstanding voltage (altitude) 4/	80,000 ft V rms (60 Hz)	300,000 ft V rms (60 Hz)
Coil to coil	250	500
Coil to case	250	500
All other points	350	500

ENVIRONMENTAL CHARACTERISTICS:

Temperature range: -70°C to +125°C.

Maximum altitude rating: 300,000 ft.

Shock (specified pulse): MIL-STD-202, method 213, test condition C, except peak value shall be 200 g's for 6 ±1 ms. Contact chatter shall not exceed 10 µs for closed contacts and 1 µs maximum for open contacts.

Vibration (sinusoidal): Applicable; 30 g's maximum and frequency range shall be 10 to 3,000 Hz. Contact chatter shall not exceed 10 µs maximum for closed contacts and 1 µs maximum for open contact.

Vibration (random): MIL-STD-202, method 214, test condition IG (0.4 g^2/Hz, 50 to 2000 Hz), 15 minutes each plane. Contact chatter shall not exceed 10 µs maximum for closed contacts and 1 µs maximum for open contacts.

Acceleration: Applicable (15 g's maximum).

PHYSICAL DATA:

Terminal strength:

Solder-hook terminals:

Twist test: Applicable to all terminals.

Pull force: 0.030 diameter: 3 ±0.3 lb.
0.062 diameter: 10 ±1 lb.

4/ Dielectric may be improved by suitable insulation of terminals and wiring after installation.

Plug-in terminals:

Bend test: Applicable to all terminals.

Pull force: 0.030 diameter: 3 ±0.3 lb.
0.062 diameter: 10 ±1 lb.

Terminal solderability: Applicable to solder terminals only.

Dimensions and configuration: See figures 1, 2, and 3.

Weight: DC coils 40.9 g (1.44 oz) maximum.
AC coils 45.4 g (1.6 oz) maximum.

Seal: Hermetic; relays are sealed by welding (laser, TIG (tungsten inert gas) or other suitable means as approved by the qualifying activity).

Identification of product: Applicable.

Construction (internal and external): All welded, except coil magnet wire to coil lead wire is soldered.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles, unless otherwise specified (see contact data).

Low level: 100,000 cycles, unless otherwise specified (see contact data).

Part or Identifying Number (PIN): M6106/50- (plus dash number from table I).

TABLE I. Dash numbers and characteristics. 1/

Dash numbers M6106/50-	Coil data							Figure	A dimension (maximum)	Terminals
	Rated voltage 2/	Maximum voltage	Res. Ω min	Max. coil current (A) at 25°C	Pickup voltage					
					Normal 3/	High temp. test	Cont. current test			
	Unsuppressed									
001	28 V dc	29 V dc	540	.055	18	19.8	22.5	1	1.010	Solder hook
002	"	"	"	"	"	"	"	2	"	Socket pin
003	"	"	"	"	"	"	"	3	"	Solder hook
	Suppressed dc coils 4/ 5/									
004	28 V dc	29 V dc	540	.055	18	19.8	22.5	1	1.125	Solder hook
005	"	"	"	"	"	"	"	2	"	Socket pin
006	"	"	"	"	"	"	"	3	"	Solder hook

See footnotes at end of table.

TABLE I. Dash numbers and characteristics - Continued. 1/

Dash numbers M6106/50-	Coil data							Figure	A dimension (maximum)	Terminals
	Rated voltage 2/	Maximum voltage	Res. Ω min	Max. coil current (A) at 25°C	Pickup voltage					
					Normal 3/	High temp. test	Cont. current test			
AC coils (400 Hz)										
007	115 V ac	122 V ac	N/A	.04	90	95.4	103.5	1	1.125	Solder hook
008	"	"	"	"	"	"	"	2	"	Socket pin
009	"	"	"	"	"	"	"	3	"	Solder hook

1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits are not recommended for subsequent use in low level applications.
2/ Caution: Use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.
3/ Pickup voltage over the temperature range (dropout voltage not applicable to latching relays).
4/ Back emf 5 V dc maximum.
5/ DC coil resistance is not directly measurable at coil terminals.

TABLE II. Time current relay characteristics at 25°C. 1/ 2/

1	15 A - 1 hour
2	50 A - 5.0 seconds
3	100 A - 1.2 seconds
4	250 A - 0.2 second
5	350 A - 0.1 second

1/ Caution: Compare with time current characteristics of the associated circuit protective device.
2/ Time-current relay characteristics at +25°C. Relays shall sustain five applications (make and carry only) of power concurrently on adjacent poles at each of five different current levels for the time durations specified in table II. Separate relays shall be tested at 28 V dc and 115/200 V dc, 400 Hz, 3 phase. Cooling time between successive applications shall be 30 minutes. The test shall be performed on both normally open and normally closed contacts of each relay. There shall be no failures or evidence of welding or sticking and relays shall pass contact voltage drop at conclusion.

Qualification inspection and group A inspection: Relays shall be tested in accordance with the operational reliability requirements of MIL-R-6106 using the alternate low level method. The contact test load shall not exceed 10 mA maximum at 6 V dc maximum.

Qualification by similarity: See table III.

TABLE III. Qualification by similarity. 1/

PIN M6106/50-	Basic qual.		Dynamics				Environmental			
	Loads		Sockets/pins							
	A	B	A	B	C	D	E	F	A	B
	DC 2/ 3/	AC (400) 2/ 3/	DC fig 1 2/ 3/	DC fig 2 2/ 3/	DC fig 3 2/ 3/	AC (400) fig 1 2/ 3/	AC (400) fig 2 2/ 3/	AC (400) fig 3 2/ 3/	DC 2/ 4/ 5/	AC (400) 2/ 4/ 5/
001	4		2						4	
002	4			2					4	
003	4				2				4	
004	1,2,3		1						1,2,3	
005	1,2,3			1					1,2,3	
006	1,2,3				1				1,2,3	
007		1,2,3				1,2				1,2,3
008		1,2,3					1,2			1,2,3
009		1,2,3						1,2		1,2,3

1/ See MIL-R-6106 for guidelines for determining how relays are to be grouped and ranked within each subgroup.
2/ Coils (dc suppressed and ac networks). Discretes qualify only discretes. Hybrids qualify only hybrids. DC standard coils can be qualified by suppressed coils.
3/ Socket pin type terminals are considered worst case. Solder hooks may be qualified by similarity.
4/ Socket pins (with gasket seals) are considered nonsimilar to solder hooks and each must be tested.
5/ Electromagnetic interference (EMI) test must be performed on each type of ac network.

Supersession data: See table IV.

TABLE IV. Supersession data.

Superseded PIN MS27744-	New PIN M6106/50-
1	001
2	002
3	007
4	008
5	No superseding dash number
6	"
7	"
8	"
9	003
10	009

Revision letters are not used to denote changes due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - AS
Air Force - 85

Review activities:
Navy - EC
Air Force - 99
DLA - ES

Preparing activity:
Air Force - 85

Agent:
DLA - ES

(Project 5945-0901-01)